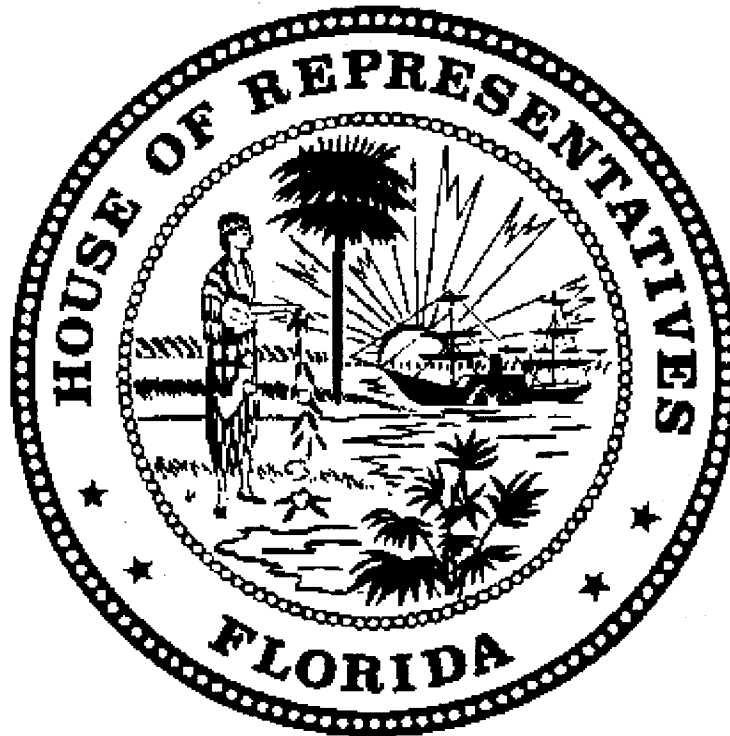


Florida House of Representatives

Florida Agricultural Best Management Practices (BMPs)



Committee on Agriculture

January 2006

**Florida House of Representatives
State Resources Council
Agriculture Committee**

A Review of

**Florida Agricultural Best Management Practices
(BMPs)**

Introduction

Best Management Practices (BMPs) refer to practices or combinations of practices determined by research or field testing in representative sites to be the most effective and practicable methods to minimize the offsite movement of agricultural pollutants to ground or surface water, taking into consideration economic and technical factors. BMPs, after extensive rule development workshops, are adopted into the Florida Administrative Code by the Department of Agriculture and Consumer Services (department). Voluntary BMP programs are an alternative to regulatory programs as tools to address water quality issues as they relate to agriculture. The benefits of implementing BMPs affect the lives of every Floridian by improving nonpoint source runoff, as well as conserving Florida's precious water supply.

The purpose of the report involves reviewing BMPs developed and adopted by department rule, their acceptance and use by the agricultural industry, expenditures/investments made by interested parties in developing and implementing BMPs, and the overall effectiveness of the BMP programs.

Methodology

Information was obtained through interviews and written materials provided by the department, as well as the Florida Department of Environmental Protection (DEP), various water management districts, the University of Florida's Institute of Food and Agricultural Sciences (IFAS), the United States Department of Agriculture's National Resources Conservation Service (NRCS), industry representatives, agricultural producers participating in the BMP program, and other interested parties. Additionally, relevant Florida Statutes and administrative rules were reviewed as a means of becoming familiar with current law. The data and findings gathered as part of this exchange are presented in this report.

History of the Best Management Practices (BMPs) Program

In 1995, the Florida Legislature established the Office of Agricultural Water Policy (OAWP) within the Department of Agriculture and Consumer Services. OAWP serves to facilitate communications among federal, state, and local agencies, and

the agricultural industry on water quantity and water quality issues involving agriculture. More directly, OAWP is involved in the development of BMPs, addressing both water quality and water conservation on a site specific, regional, and watershed basis. The OAWP works cooperatively with agricultural producers and industry groups, the DEP, the university system, water management districts, and other interested parties to develop and implement BMP programs that are economically and technically feasible.

Prior to the creation of the OAWP, some BMP programs were already in place. BMPs for silviculture in Florida were first established in the mid 1970's in response to the Federal Clean Water Act of 1972. Those original BMPs were designed exclusively to protect Florida's streams and lakes from potential sources of pollution associated with forestry activities.

In 1992, then Agriculture Commissioner Bob Crawford established a BMP Technical Advisory Committee composed of representatives from state and federal government, university groups, the forestry industry and environmental interests. The committee was charged with reviewing the existing silviculture BMP manual and revising it to reflect scientific, social and economic changes that had occurred since the original BMP development. The committee continues to meet biennially to evaluate the implementation and effectiveness of BMPs.

Current Law

Current law sets the standard for the development and implementation of

BMPs. Section 576.045, F.S., establishes legislative intent as it relates to nitrogen and phosphorus residues found in ground and surface waters. Pollution such as this is commonly known as nonpoint source pollution (NPS). NPS pollution is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water.

The statutes set forth a program, as well as a funding mechanism and other criteria, for establishing a BMP program to address the issue of NPS pollution. The statutes require a memorandum of understanding to be implemented by the department and the DEP regarding the waiver of liability. As the name implies, the waiver of liability protects the property owner or leaseholder from litigation by the DEP for contamination of ground or surface water.

The waiver of liability goes into effect when a property owner or leaseholder agrees either to:

- (a) Provide the department with a notice of intent (NOI) and implement the applicable BMPs, or
- (b) Stop using soil-applied nutritional materials containing nitrogen or phosphorus.

By completing the requirements to obtain a waiver of liability, there is a presumption of compliance with water quality standards on the part of the property owner or leaseholder.

The statutes require monitoring and verification of the effectiveness of the BMPs at representative sites. The OAWP works in collaboration with IFAS, DEP, water management districts and agricultural landowners statewide to document and quantify the effectiveness of selected BMPs in improving water quality. These are relatively long-term efforts due to the need to gather both pre-BMP implementation data and post-BMP implementation data. They must also allow for multi-year variation in weather/rainfall patterns.

Projects are underway across the state and are focused on specific subsets of BMPs that have been determined by all of the collaborators to be the ones likely to have the biggest impact on improving water quality. One example involves: measuring the effect of converting screw-gate water control structures to structures that employ riser-boards. The screw-gate structures allow the discharge of water from the bottom, which results in the loss of sediments and aquatic weeds. The riser-boards force the water to flow over the top of the structure, trapping the sediments and aquatic weeds on-site.

Within the Okeechobee watershed, emphasis is placed on evaluating the impact of maximizing the ability of landowners to retain more stormwater onsite. Tactics to accomplish this goal include the rehydration of marginal or previously dredged wetland areas and strategic placement of culverts and riser structures to allow the landowner more control over runoff. Other efforts are underway to evaluate the effectiveness of nutrient components and also the evaluation of slow-release fertilizer formulation.

While most BMP programs are voluntary, the implementation of BMPs is mandatory for certification with the Division of Aquaculture.¹ Additionally, the Division of Aquaculture conducts an annual site inspection to determine compliance with the BMPs. If an aquaculture facility fails to comply with the BMPs within a reasonable amount of time, the certification is revoked and the facility is referred to the DEP or the appropriate water management district for regulatory permitting.

BMP Manual Development and Adoption

Although the steps may vary somewhat, there is generally a defined flow pathway that most BMP manuals follow. Critical steps include: identification of need, creation of a Steering Committee, definition of agency roles, formation of technical workgroups, production of a draft manual, peer review text, public workshops, adoption of manual in code (Florida Administrative Code), and the printing of manuals for distribution. The timeframe for the development of the BMP manual varies but generally takes 9-12 months for rule adoption.

Manual development and adoption is a collaborative effort of groups typically including OAWP, DEP, the water management districts, IFAS, various grower/industry associations, other interested stakeholders, and growers themselves all working together.

Appendix A presents a chart showing the implementation rates for BMP programs that have been adopted. BMP manuals for these programs are

¹ ss. 597.004 (1), (2), F.S.

accessible on the department's website.²

New BMP programs are being adopted and implemented in:

- Peace River/Manasota Basins (citrus),
- Caloosahatchee River Basins (citrus),
- ornamental nursery production (statewide),
- cow/calf production (statewide), and
- vegetable and agronomic production (statewide).

Process for Participation in BMP Program

For an agricultural producer to become involved in the BMP program, four steps must take place. Initially, an assessment of the producer's farming operation is conducted to determine which BMPs are necessary. The OAWP and NRCS generally work together to conduct the assessment.

Once the assessment has been completed, the producer must submit a Notice of Intent (NOI). The NOI serves as a formal notification to the department of a producer's commitment to implement BMPs adopted by the department. Additionally, the submittal of the NOI is required by law for producers to be eligible for the waiver of liability, presumption of compliance with water quality standards, and cost share funds for BMP implementation.

After the assessment has been completed, the design of the BMPs is undertaken. No two agricultural operations are alike, so BMPs must be specifically designed to each individual situation. BMPs may be either structural or non-structural. Non-structural BMPs refer to management practices that may be accomplished with a minimal amount of capital outlay. An example of a non-structural BMP would be to move feeding stations away from the vicinity of surface water to prevent areas of concentrated waste accumulation and denuded vegetation.³ Other non-structural BMPs include the implementation of nutrient management plans.

Structural BMPs refer to measures that require infrastructure changes, in addition to capital outlay. There are a number of state and federal funds, referred to as cost-share, to assist producers with the implementation of structural BMPs.⁴

As a prerequisite to receiving federal and state cost-share, NRCS develops a conservation plan. The planning process provides the framework for developing conservation plans on the basis of ecological, economic, social, and policy considerations. Each conservation plan developed for the producer by NRCS is a three-phase, nine-step process:

Phase I – Collection and Analysis (understanding the problems and opportunities)

2

www.floridaagwaterpolicy.com/BestManagementPractices.html

³ See Appendix B for example of a non-structural BMP

⁴ See Appendix C for example of a structural BMP

1. Identify problems and opportunities
2. Determine objectives
3. Inventory resources
4. Analyze resource data

Phase II – Decision Support
(understanding the solutions)

5. Formulate alternatives
6. Evaluate alternatives
7. Make decisions

Phase III – Application and Evaluation
(understanding the results)

8. Implement the plan
9. Evaluate the plan

Although the nine steps are listed in a particular sequence, the process is very dynamic, as shown by the illustration in Appendix D.

Once a conservation plan is developed, the NRCS and the OAWP provides technical assistance during the implementation of the plan. In some instances, due to a shortage of manpower by NRCS, certified technical service providers (TSP) are contracted to provide technical assistance to producers in implementing the conservation plans. TSPs are individuals, nonprofit organizations, or public agencies outside of the USDA that help producers carry out the provisions of the conservation plan. The OAWP executed a memorandum of understanding with the NRCS in 2002 to facilitate the delivery of BMPs statewide.

Once the conservation plan is in place, NRCS and OAWP personnel monitor the BMPs to ensure the intended effect is taking place. On occasion, some

“tweaking” must occur to ensure the BMPs are functioning as desired.

Effectiveness of BMPs

Under the law, OAWP has the obligation to ensure implementation of the BMPs. This means that appropriate BMPs are selected to address the environmental concerns identified at each agricultural operation, and that those BMPs are being correctly managed, operated, and maintained. According to OAWP, this is critical because an accurate assessment of BMP effectiveness can only be made if it is based on the correct BMP, or combination of BMPs, being properly implemented. Each of the OAWP BMP programs requires records to be kept by producers and conducts on-site visits to address these two requirements. Depending upon the commodity, this may be accomplished by OAWP staff, Soil and Water Conservation District technicians, or contract personnel.

Similarly, under the law, DEP has an obligation to verify that the BMPs are effective in achieving the intended environmental result.⁵ This generally occurs in two steps:

- Initial verification based on best professional judgment by DEP, and
- A subsequent technical verification based on research and monitoring at representative sites where BMPs have been implemented.

According to the OAWP, the legislature’s decision to establish a two-

⁵ s. 403.067(7)(c)

step BMP verification process was clearly designed to accelerate environmental improvement and is based on several important considerations. First, although BMPs are based on the best science and research available, they have not been historically implemented in a comprehensive program applicable to production agriculture as is currently directed by statute. Further, the effectiveness of BMPs is dependent on many variables, including the amount of time these practices have been used, the combination of practices chosen, weather, soils, and the location within a watershed. Finally, rather than waiting on long term research to evaluate the effect of these variables, the legislature recognized that there is sufficient information available to immediately begin implementing practices that will have positive environmental effects even if they are ultimately determined to need revision to achieve the intended result.

For these reasons, OAWP feels that the BMP rules and manuals that it has adopted represent the best starting point for environmental improvement. There is every expectation that the long term research and monitoring at representative sites where BMPs have been implemented may lead, as is required by law, to revisions in the BMPs, or new BMPs, which producers would subsequently be required by rule to implement.

Currently, research projects are underway at agricultural field sites for all OAWP BMP programs to evaluate BMP effectiveness in improving water quality. This research is typically performed by IFAS, funded by OAWP, DEP, and

water management districts, and usually takes several years to complete because of the need to establish pre-BMP baselines and observe post-BMP effects. In order to develop guidelines for this research-based verification of BMP effectiveness, DEP and OAWP have formed an Interagency Technical Advisory Committee that also includes representatives of agricultural and environmental interests. In addition, OAWP has instituted a computerized BMP tracking system and has reassigned two recently vacant staff positions, creating a new section within OAWP, to assure statewide compliance with implementation of BMPs and to coordinate with DEP on the verification of BMP effectiveness.

Funding

OAWP receives funding for the BMP programs primarily from documentary stamp tax revenue⁶ and the Water Protection and Sustainability Program.⁷

In addition to the funding mentioned above, funding for the various aspects of BMP adoption and implementation comes from many sources. Section 319 (Federal Clean Water Act) funds, provided by DEP, assist with the publishing of the BMP manuals. This money also assists in funding BMP implementation teams. These implementation teams work closely with growers to assure the proper selection and implementation of BMPs on site.

Additionally, Florida's five water management districts contribute funds to assist with BMP implementation and monitoring.

⁶ s. 201.15(8), F.S.

⁷ s. 403.890, F.S.

IFAS receives funding at both the state and federal level for research and extension projects and programs relating to BMPs. In addition, industry groups, as well as producers, provide both funding and in-kind contributions to IFAS for utilization in the research and development of BMPs.⁸

NRCS provides cost-share funds to producers through the Environmental Quality Incentives Program (EQIP). EQIP is a voluntary program that provides assistance to agricultural producers in a manner that will promote agricultural production and environmental quality as compatible goals, optimize environmental benefits, and help farmers and ranchers meet federal, state, tribal, and local environmental requirements. As mentioned previously, NRCS works with producers to develop a conservation plan. This plan becomes the basis of the cost-share agreement between NRCS and the producer. Generally, these plans/agreements are in place for a term of 10 years.

The 2002 Farm Bill limited the total amount of EQIP cost-share and incentive payments paid to an individual or entity to an aggregate of \$450,000, directly or indirectly. The cost-share ratio for EQIP that NRCS will provide is up to 75%. During program year 2005, the NRCS issued nearly \$20 million in EQIP funds in Florida.

While the NRCS does not require the state to match the federal funds, doing so gives the OAWP a voice in setting state policy, fosters a good working

relationship with the NRCS, reflects the commitment by the OAWP in the promotion of environmental quality, and allows both federal and state monies to go farther in implementing BMPs.

Since the inception of OAWP, an estimated \$20 million in state funds has been spent on BMP research, development, implementation, and technical assistance, with producers contributing approximately \$5 million. The cost-share for the producer varies depending upon the commodity produced. Additionally, the producer's portion of the cost-share is sometimes provided by in-kind contributions, i.e. setting aside a certain number of acres of land to serve as a buffer area.

Opponents and Proponents of BMPs

As effective and beneficial as BMPs are, they are not without critics. Linda Young, southeast regional director for the Clean Water Network (CWN), applauds the state for developing incentives for getting producers to implement BMPs. For the CWN, the problem lies with the presumption of water quality compliance. They feel, as do other critics, there needs to be some form of monitoring at all sites where BMPs are being implemented. Current law only calls for monitoring at representative sites.

One of the most vocal critics of BMPs is Earthjustice, a non-profit public interest law firm dedicated to protecting the natural beauty, resources and wildlife of the earth and to defending the right of the earth's inhabitants to a healthy environment. David Guest, the managing attorney of Earthjustice's office in Tallahassee, espouses that

⁸ See Appendix E for list of extension and research projects conducted by IFAS.

BMPs are a placebo to create an illusion of the OAWP helping the industry to comply with water quality standards. Specifically, Mr. Guest feels the main problems with the BMP program are:

- OAWP ignores the legal limits relating to water quality standards imposed upon other industries and only alludes to reduction of pollutants with no hard proof.
- The fact that only representative sites of BMP implementation are monitored for compliance.
- Growers/producers only implement BMPs when it is financially to their advantage.

In March 2005, Earthjustice successfully represented the CWN, and other environmental groups, in a lawsuit forcing DEP to enforce water pollution laws that prohibit dairies from dumping untreated animal waste into surface and groundwater.⁹ Earthjustice is slated to go to court in early 2006 to bring suit¹⁰ against the South Florida Water Management District to ensure the enforcement of the Clean Water Act in Lake Okeechobee.

Other environmental groups, such as the Audubon Society and the Nature Conservancy, laud the OAWP for the strides made in improving nonpoint source runoff. Lee Killinger, of the Nature Conservancy, says, "BMPs that actually work are definitely a step in the right direction."

⁹ State of Florida Department of Environmental Protection, Sunshine State Milk Producers, Inc. v. Save of Suwannee, Inc., Manasota-88, Inc., The Conservation of Alliance of St. Lucie County, Inc., and Linda L. Young, Case No. 1D04-1258

¹⁰ Friends of the Everglades, et al., v. South Florida Water Management District, et al, Case No. 02-CV-80309-ALTONAGA/Turnoff

Findings

During the course of conducting this study, several suggestions were made by various individuals involved in the BMP process regarding changes to enhance and/or streamline the process. Those suggestions are listed below.

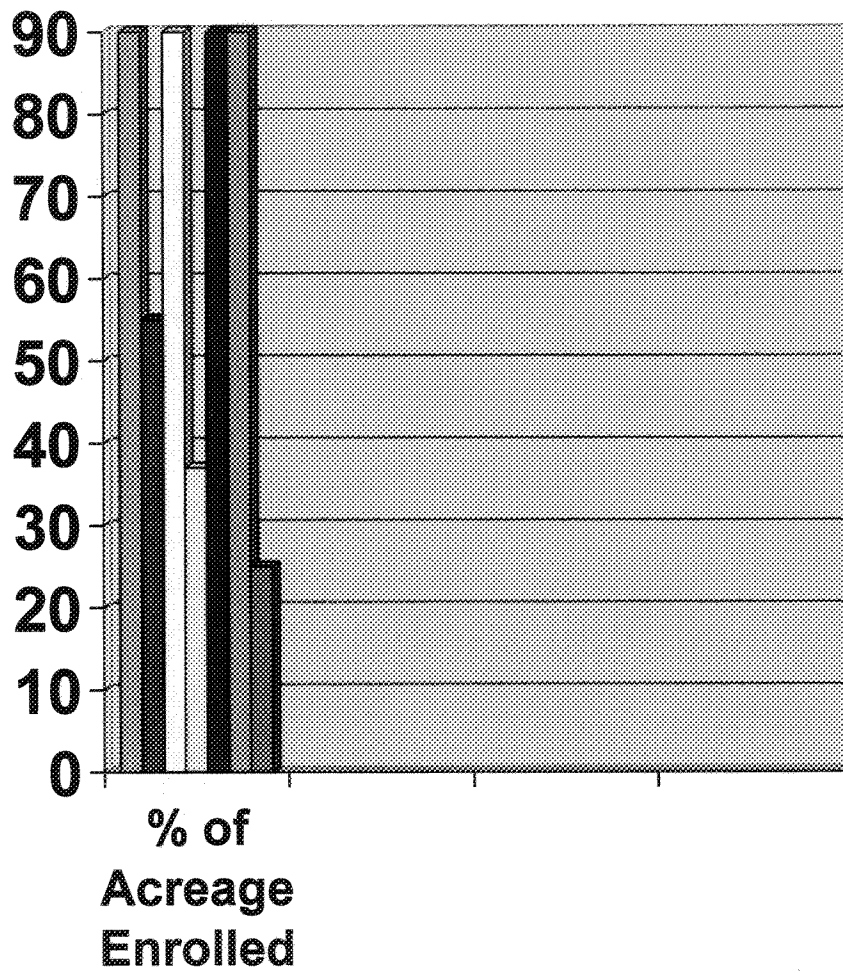
- Due to the successful implementation of the Suwannee River Partnership¹¹, it has been suggested to use this partnership method in other areas of the state to corral the efforts of the various affected parties.
- There was a general consensus of a need for a better network of communication with the various industry groups to educate growers/producers regarding the BMP process to increase grower/producer awareness and comfort with the process.

(Most of the industry groups interviewed have some form of education in place regarding BMPs. Generally, the information is disseminated through articles in newsletters, training at annual conferences, etc. Additionally, the Florida Farm Bureau conducts training for its members, as well as including articles in newsletters regarding the benefits of BMP implementation.)

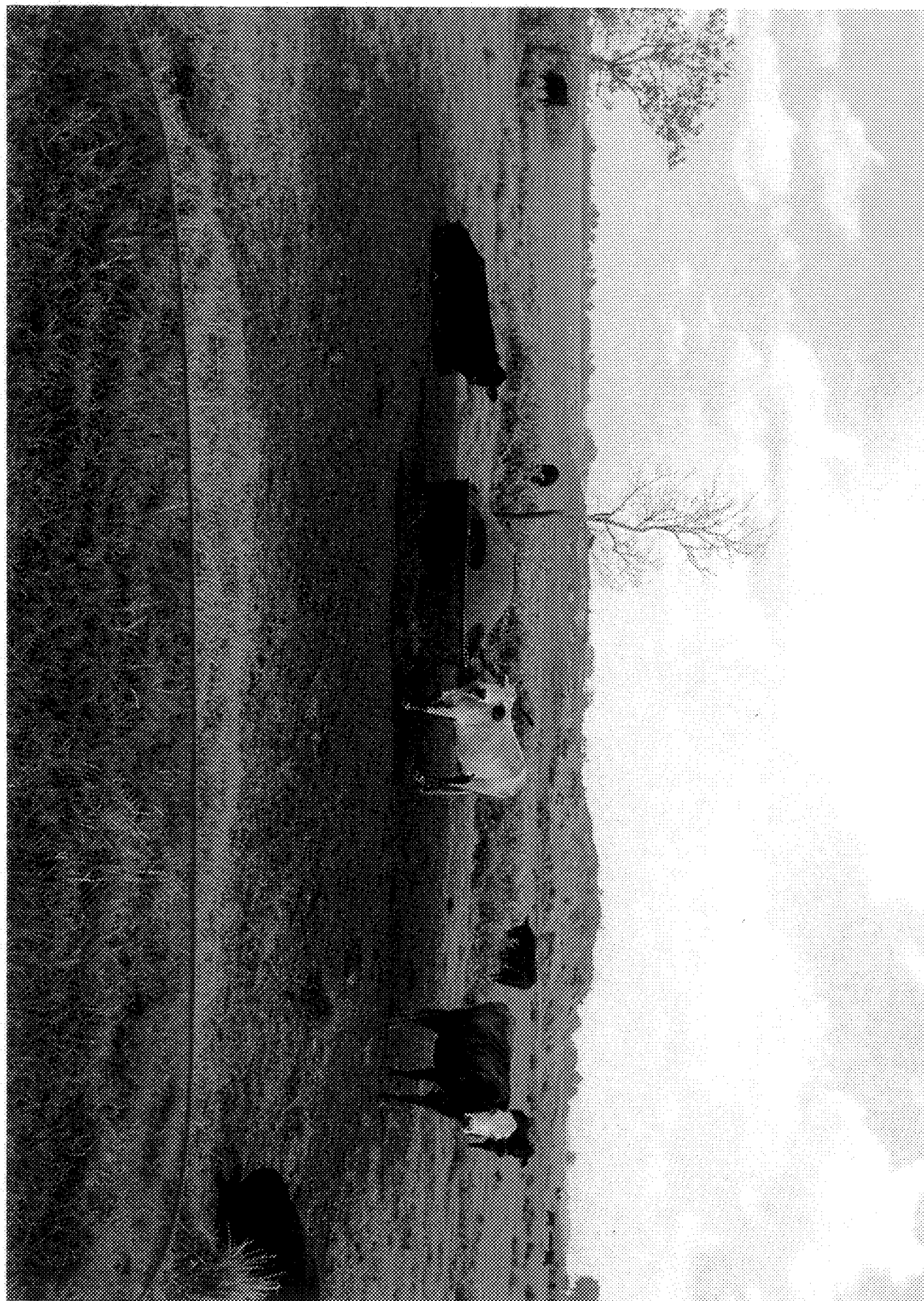
¹¹ See Appendix F.

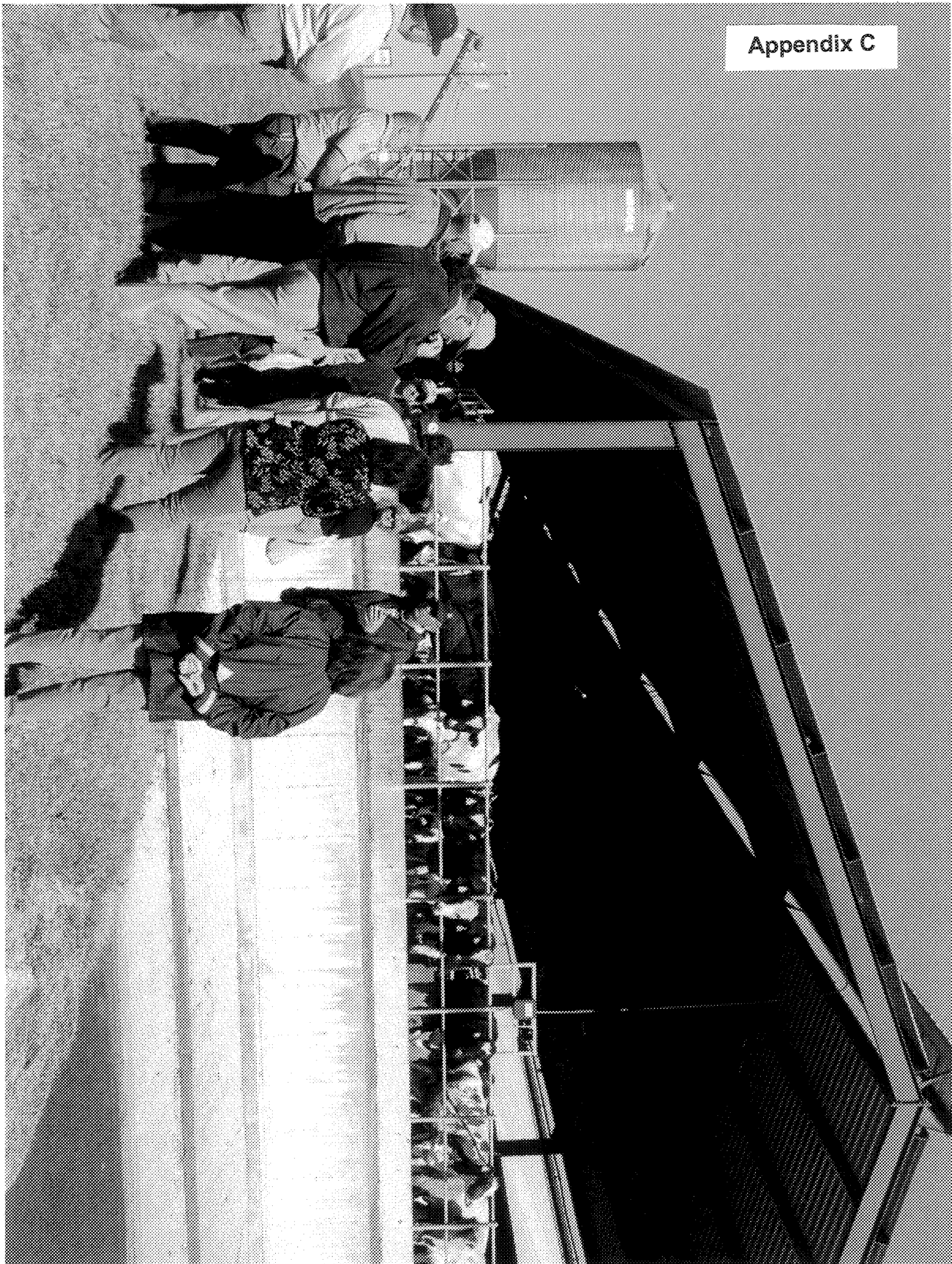
- More than one group interviewed expressed a need for additional funds in the department's budget to be earmarked for education and training programs relating to the BMP process.
- The NRCS expressed concern regarding the differences in the way the federal funds and the state funds are allocated. The federal funds provided by the NRCS are generally earmarked for a 10 year period; the state funds are appropriated on a year-to-year basis. According to the NRCS, the state's ability to earmark funds in advance would expedite the implementation of programs and streamline the process.
- Additionally, the NRCS suggested entering into a cooperative agreement with the state, allowing the state funds to go directly to the NRCS for distribution. Therefore, the funds provided by the state could be earmarked in the same fashion as the federal funds, thus creating a more efficient method of disbursement.
- The suggestion was made to monitor all sites where BMPs have been implemented, rather than representative sites, to ensure compliance.
- Additionally, the suggestion was made for OAWP not only to monitor said sites, but to disclose on a public website the effectiveness of the BMP implementation.
- There was a concern regarding a lack of communication at the agency level. In particular, a failure to use and distribute information/research proven effective in certain areas of the state that might prove useful in other areas of the state.

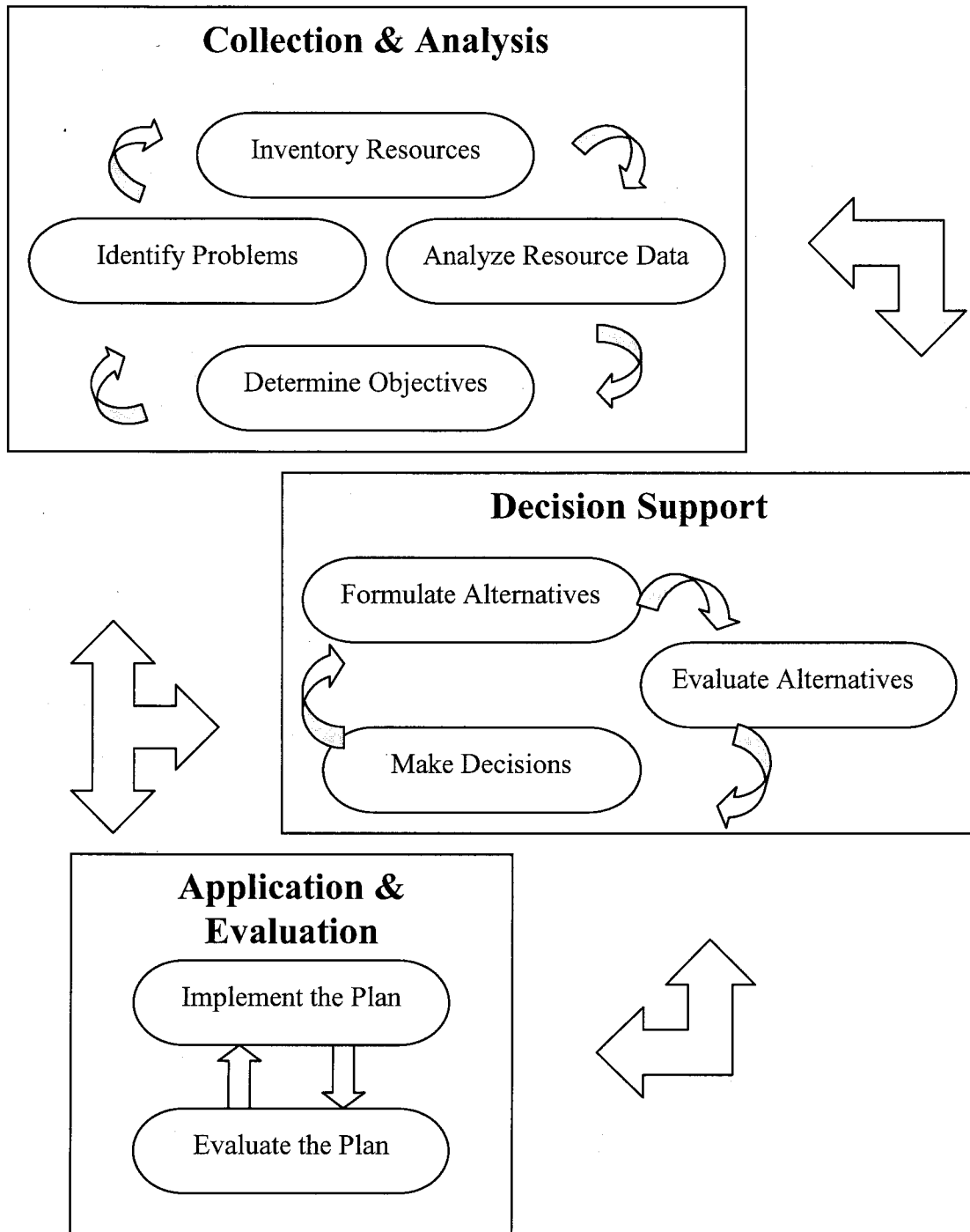
BMP Program Implementation Rates



Indian River Citrus	Ridge Citrus
Lake Okeechobee (4 priority basins)	Lake Okeechobee (entire watershed)
Suwannee River Partnership (dairy)	Suwannee River Partnership (poultry)
Suwannee River Partnership (row crop)	







UF/IFAS Extension and Research Programs on Nutrient Management and Closely Related Projects in the Suwannee/Santa Fe Rivers Area

Suwannee River and Santa Fe River

2000-2004

The following material was summarized from information supplied by UF/IFAS unit leaders and principal investigators responding to an inquiry about funded research and extension projects and programs. List compiled by George Hochmuth, 5 January, 2004.

ON-GOING PROGRAMS:

Suwannee River Partnership

IFAS personnel participate regularly in meetings and programs (CARES events, EPA tours, special tours, demonstrations, research projects, etc.) with the Suwannee River Partnership. IFAS personnel provide updates to the Partnership on research and extension programs. **J. Jones** regularly works with the Partnership technical staff, including **D. Smith, Joel Love, and H. Thomas**.

North Florida REC-Quincy and Suwannee Valley, Soil and Water Science, Agricultural and Biological Engineering, Agronomy, Horticultural Sciences, Environmental Horticulture Departments, School Forest Resources Conservation, and Counties

Livestock Waste Testing Lab and Nutrient Management Program

Conducts analyses and makes recommendations on approximately 500 (annually) livestock waste samples. Funded from consortium, including, FDACS, SRWMD, USDA-NRCS, Sunshine State Milk Producers, Goldkist, and Florida Rural Water Assoc. Produces the Poop Scoop newsletter at least twice per year. Lab personnel make educational presentations at various grower and agency personnel training programs and participate in The Partnership programs (\$28,000 annually, **G. Hochmuth and Justin Jones**). Funds from several additional IFAS NFREC grants (\$15,000) make up the difference in costs to operate the lab.

DACS Nitrate BMP program (old program)

Watermelon BMP. Two-year program to demonstrate nitrate BMP programs for watermelons on a commercial scale. Funded for two years, 2002-2004. (\$90,000 total, **G. Hochmuth, E. Simonne, and B. Hochmuth**).

Pine tree BMP. Two-year program to demonstrate nitrate BMP programs for pine trees. Funded for two years, 2002-2004. (\$30,000 total, **J. Nowak and G. Hochmuth**).

Hay and forage demonstration at NFREC-SV, commercial-scale. (**D. Graetz, J. Jones, and others**).

Verification of interim BMPs for nitrogen fertilization in hayfields within the Suwannee River Water Management District. Funded for 3 years 2002-2004, dairies north of Bell Florida. Total budget is \$310,687. **Sollenberger, Graetz, Scholberg, Chambliss, and Woodard**.

Testing and Documenting the use of crop growth models as BMP tools for predicting crop production, N uptake, and nitrate leaching. Funded for 3 years. Total budget is \$163,500. **Ken Boote**. Adapting CROPGRO forage model to a perennial forage model for Bahia and Bermuda grass for N uptake and BMNP use.

Evaluating Effectiveness of Best Management Practices for Fertilizer Management for Hay Production to Reduce Nutrient Inputs into Groundwater in the Suwannee River Basin. **D. A. Graetz**. FDACS. \$68,250

FDACS Nitrate BMP program (new program)

BMP implementation, verification, and modification. 10-year demonstration program for vegetables, hay/forages, and pine trees at NFREC-SV. (\$45,000 per year for 10 years, **G. Hochmuth, B. Hochmuth, E. Simonne, D. Graetz, J. Nowak, and J. Jones**).

BMP modeling. A new proposed program to use existing data to test nutrient models for the SV area. **R. Mylavarapu, W. Graham, M. Dukes, G. Hochmuth, K. Woodard, and others**.

Other DACS

Training for Comprehensive Nutrient Management Planning for Third-Party Vendors. Starting 10/31/01 for \$452,638 from FDACS. **R. Mylavarapu, R. Brown, and R. Nordstedt.**

“Implementation guide for container grown plant interim measure”, a BMP publication available on Extension Service EDIS system. **Tom Yeager.** In addition, Dr. Yeager is conducting training session on interim BMPs for nursery operations and he is working with May Nurseries in Havana, FL in northern Florida near Tallahassee/Quincy area.

USDA

Geo-Temporal Estimation and Visualization of Nitrogen in a Mixed-Use Watershed (Santa Fe Basin). **S. Grunwald, N. Comerford, D.A. Graetz, and M. Clark.** USDA. \$679,535.

Manure Phosphorus Management for the Suwannee River Basin: A Model for Highly Leachable Soils. **W. G. Harris, V. D. Nair, D. A. Graetz, R. D. Rhue, and S. R. Mylavarapu.** USDA. \$746,000.

USDA-SARE program

Demonstration of soil water movement in vegetables grown with plasticulture. \$14,125 from USDA-SARE Program for 2003. **E. Simonne, M. Dukes, B. Hochmuth, and J. Jones.** Uses dye to demonstrate nutrient movement in soils beneath vegetables with various drip irrigation management programs.

T-STAR program

Field testing of possible BMPs for vegetables grown in the Caribbean Basin. \$150,000 for three years from USDA, T-STAR program. Tomato nutrient management and nutrient groundwater loading. To determine nitrate leaching under tomato production implementing IFAS BMP programs. **E. Simonne, B. Hochmuth, G. Hochmuth, and M. Dukes).**

EPA 319/FDACS/SRWMD

Evaluating Effectiveness of Best Management Practices for Animal Waste and Fertilizer Management to Reduce Nutrient Inputs into Ground Water in the Suwannee River Basin

Phase 1 and 2: \$1,019,450 Program starting 12/31/99; Renewal for years 4 and 5: \$525,723 plus \$140,000 for BMP Verification Monitoring on additional dairy and poultry farms. (**D. Graetz, W. Graham, G. Hochmuth, R., Mylavarapu, M. Dukes, J. Jones**).

Florida Water Resources Research Center

Evaluation of water use and nutrient leaching with high-frequency irrigation for use in Best Management Practices. 2002 for \$16,494. **M. Dukes**.

Miscellaneous research and extension at NFREC-SV

Several research projects are carried out at NFREC-SV focusing on nutrient management and filling in gaps in knowledge about nutrient management. Examples include:

Nitrogen studies with silage corn (**J. Jones and C. Starling**),
Potato nitrogen timing (**J. Jones and G. Hochmuth**),
Nitrate and irrigation programs (**E. Simonne** and others),
Various studies on nutrient requirements of crops (**G. Hochmuth, B. Hochmuth, E. Simonne**).
Field testing nitrogen BMP recommendations for vegetables (**G. Hochmuth, E. Simonne**).
N mineralization from animal wastes (**G. Hochmuth, J. Jones, D. Graetz**).
Pine tree nitrate management (**J. Nowak**).
Demonstrating nitrate management on commercial-scale watermelon production (**G. Hochmuth, E. Simonne, B. Hochmuth, and J. Jones**).

County extension projects

On-farm irrigation demonstrations. Provided soil moisture measuring devices and record books to local farmers to help them learn to adopt and manage new soil moisture measuring devices and learn to use the devices to manage irrigation frequency and amounts. Growers reported they reduced early-season irrigation amounts by 50% (**B. Hochmuth and county agents**).

Bradford County Growers adopt drip irrigation as a BMP. Growers in the survey reported using drip irrigation and realizing a reduction in water application by 50% and a reduction in fertilizer amounts by 25%.

Levy County watermelon growers adopt drip irrigation, resulting in 30-50% reduction in water use and an average 40-pound per acre reduction in nitrogen use.

NFREC-SV Field days and workshops

Each year NFREC-SV hosts field days, short courses, workshops, and schools (totaling about 6 programs per years) which contain educational sessions on nutrient management on hay, vegetables, and pines. Attendance varies from 50 to over 200 at each program. (**B. Hochmuth, E. Simonne, G. Hochmuth, J. Nowak, M. Dukes, J. Jones, C. Starling, A. Tyree, and others**).

Drip Irrigation School began in 2001 at NFREC-SV teaches growers the basics of irrigation management, including nutrient management with drip irrigation (**E. Simonne**).

Educating Youth. In the past three years, over 6,000 youth have visited the NFREC-SV to learn about agriculture in the Suwannee Valley area and to learn about agricultural science and biology. The field trips to the Center result in greater awareness of agriculture and its importance to the local economy (**B. Hochmuth and county agents**).

NFREC website

The NFREC-SV website <http://nfrec-sv.ifas.ufl.edu> is a nationally recognized and awarded website. It contains considerable information and publications on nutrient management and waste management, and UF/IFAS agricultural programs on-going in the Suwannee Valley area.

Fisheries and Aquatic Sciences

<u>PROJECT - PIs</u>	<u>FUNDING AGENCY</u>	<u>LEVEL</u>	<u>DURATION</u>
Coastal eutrophication and the productivity of clams and oysters/ Phlips, E.J., Baker, S., Fraser, T., Murie, D.	USDA - NRIC - Natural Resources and the Environment Program	\$440,000	2000- 2004
CLAMMRS: Clam lease	USDA - NRIC -	\$850,000	2000- 2004

assessment and management Initiative for Future
and modeling using remote Agriculture and Food
sensing/Baker, S., Philips, Systems Program
E.J.

Relationship between Suwannee River Water \$130,000 1999-
nutrient loading and Management District 2001
algal community dynamics
in the Suwannee River and
Estuary (Phlips, E.J.)

GRANTING AGENCY	PRINCIPAL INVESTIGATOR	TITLE	AMOUNT
DACS Water Management Districts	Lindberg, W.J. / Sturmer, L. N.	Shellfish Aquaculture Extension Support	\$120,250.00
	Frazer, T. / Jacoby, C.	Project Coast	\$465,000.00
FL Fish & Wildlife Conserv. Comm.	Murie, D. / Parkyn, D.	Conservation Research on Gulf of Mexico Sturgeon	\$128,396.00
FL Fish & Wildlife Conserv. Comm. Water Management Districts Suwannee River	Allen, M.	Analysis of Statewide Stream Monitoring Fisheries Database	\$35,000.00
	Baker, P. / Baker, S.	Oyster Reef Assessment in the Suwannee River Estuary	\$29,936.00
U.S. Dept. of Agriculture	Phlips, E. / Baker, S.	Implementation of Eadin: Expert Assistance and Distance Identification Network	\$70,000.00
U.S. Dept. of Agriculture	Baker, S. / Sturmer L.	CLAMMRS (Clam Lease Assessment, Management, and Modeling Using Remote Sensing): Alligator Harbor Aquaculture Use Area	\$50,683.00
FL Fish & Wildlife Conserv Comm	Murie, D. J.	Critical Estuarine Winter-Feeding Areas of Threatened Gulf of Mexico Sturgeon in the Suwannee Estuary and Blackwater Bay	\$54,819.00
USDA, CSRS	Phlips, E. J., / Baker, S. M.	EADIN: Expert Assistance and Distance Identification Network	\$34,923.00
SWFWMD	Frazer, T. K./ Canfield, Jr., D. E.	Coastal Springs Estuary Assessment - Project Coast	\$60,000.00
FL Fish & Wildlife Conserv Comm	Cichra, C. E.	Minimum Flows and Levels Criteria Development :Literature Review and Summary of the Value of Water Flows and Levels	\$20,000.00
USDC/Sea Grant	Baker, S. M.	Short-term Effects of Rapid Salinity Declines on Newly Planted Seed Clams During La Nina Conditions in Florida	\$3,515.00

USDA	Phlips, E. J., Frazer, T.K, Baker, S. M., Murie, D. J.	Coastal Eutrophication and the Productivity of Clams and Oysters	\$435,000.00
WMDSWF	Frazer, T. K. / Osenberg, C. W.	Factors Influencing the Dynamics of Vallisneria Americana and Their Effects on Restoration of Kings Bay and Other	\$82,230.00
USDA/ CSRS	Baker, S.M., Phlips, E.J., Sturmer, L.	CLAMMRS: Clam Lease Assessment, Management, and Modeling Using Remote Sensing	\$863,524.00
DACS	Lindberg, W. J., Sturmer, L. M.	Shellfish Aquaculture Extension Support	\$99,500.00
SWFWMD	Frazer, T. K.	Project Coast Extension	\$105,000.00
SWFWMD	Frazer, T. K.	Nutrient Limiting Status of Five Gulf Coast Estuaries	\$90,000.00
SRWMD	Phlips, E. J./ Bledsoe, E. L.	Consequences of Suwannee River Eutrophication for the Dynami of Algae in the River and Associated Estuary	\$107,100.00
SWFWMD	Frazer, T. K./ Canfield, D. E.	Coastal Springs/Kings Bay/Crystal River Water Quality, Vegetation, Sediment and Tidal Fluctuation Project	\$280,000.00
DEP	Fisher, S. J.	Public Education Awareness and Action to Protect Surface and Ground Water Quality in the St. Marks Wakulla River	\$18,125.00
SWFWMD	Frazer, T. K./ Canfield, D. E.	Coastal Springs Nitrate Assessment - Nutrient Assimilation Capacity of Five Gulf Coast Rivers	\$334,724.00

GRANTING AGENCY	PRINCIPAL INVESTIGATOR	TITLE	BEGINNING DATE	ENDING DATE	AMOUNT
DACS	Watson, C. A.	Risk Assessment of Sturgeon Aquaculture	01/28/2000	12/01/2000	\$4,000.00
USDA	Watson, C. A.	Reproductive Development of the Clown Loach	08/15/2000	08/30/2002	\$54,855.40
USDA	Bowen, B. R. Watson, C. A., Francis-Floyd, R., Yanong, R.	Genetic Improvement of Domestic Swordtails (Xiphopgorus Helleri)	08/15/2000	08/30/2002	\$62,386.00
DACS	Lindberg, W. J., Watson, C. A.	Tropical Aquaculture Laboratory	08/30/2000	12/01/2001	\$121,260.00
USDA	Francis-Floyd, R.; Murie, D. J., Watson, C.A., Yanong, R., Bowen, B.	Preliminary Investigation of the Nutritional Management of African Cichlids	08/15/2000	08/30/2002	\$159,035.00
Miss. State Univ. So Regional Aquaculture Center	Watson, C. A./ Yanong, R. P.	Development of Improved Harvesting, Grading and Transport Technology for ornamental Finfish Aquaculture	01/01/2001	08/24/2002	\$66,600.00
DACS	Lindberg, W. J./ Watson, C. A.	Tropical Aquaculture Laboratory Support	08/03/2001	08/02/2002	\$242,520.00
USDA	Watson, C.A.	Tropical/Immersion application of GNRH Analog in Spawning Characins	07/15/2001	07/15/2004	\$53,393.00
USDA	Canfield, Jr., D. E. / Watson, C.	Florida Ornamental Aquaculture Ground & Surface Water Study	07/15/2001	07/14/2004	\$46,614.00

Dept. of Agricul & Consumer Serv.	Watson, C.	Tropical Freeze Protection Video	02/08/2002	06/30/2002	\$24,700.00
U.S. Dept. of Agriculture	Watson, C.	Review of Data Necessary for SLN Labeling of Trichlorofon for Ornamental Aquaculture	06/01/2002	05/31/2004	\$19,073.00
U.S. Dept. of Agriculture	Watson, C. A.	Development of Design Criteria for Recirculating Ornamental Fish	06/01/2002	05/31/2004	\$89,329.00
					\$943,765.40

St. Johns River	Phlips, E.	Biological Monitoring of the Lower St. Johns River: Temporal and Spatial Trends in Plankton	09/26/2002	01/26/2004	\$56,717.00
Water Management Districts St. John's River	Phlips, E.	Factors Controlling the Abundance and Composition of the blue-green Algae in Lake Griffin	08/14/2002	12/14/2004	\$110,000.00
U.S. Dept. of Agriculture	Phlips, E. / Baker, S.	Implementation of Eadin: Expert Assistance and Distance Identification Network	06/01/2002	05/31/2004	\$70,000.00
U.S. Dept. of Agriculture	Phlips, E. / Baker, P.	Integration of Clams into Wastewater Treatment: A Diary Model	06/01/2002	05/31/2004	\$50,937.00
Dept. of Environmental Protect.	Phlips, E.	GTMNERR Water Quality Monitoring	05/07/2002	04/30/2003	\$35,110.00
City of Lakeland	Phlips, E. J.	An Evaluation of the Potential for Native Submerged Aquatic Vegetation (SAV) Growth Under Post-Dredge Conditions in Lake Hollingsworth	06/07/2001	06/06/2002	\$17,813.90
USDA, CSRS	Phlips, E. J., / Baker, S. M.	EADIN: Expert Assistance and Distance Identification Network	04/01/2001	03/31/2003	\$34,923.00
USDA, CSRS	Phlips, E. J., / Baker, S. M.	Freshwater Clams as Tertiary Treatment for Agriculture Wastewater	04/01/2001	03/31/2003	\$79,824.00
USDA	Phlips, E. J., Frazer, T.K., Baker, S. M., Murie, D. J.	Coastal Eutrophication and the Productivity of Clams and Oysters	11/15/2000	11/14/2003	\$435,000.00

USDA/ CSRS	Baker, S.M., Phlips, E.J., Sturmer, L.	CLAMMRS: Clam Lease Assessment, Management, and Modeling Using Remote Sensing	09/15/2000	09/30/2004	\$863,524.00
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CONTRACT AND GRANT ACCOUNTS

ACCOUNT NUMBER	GRANTING AGENCY	PRINCIPAL INVESTIGATOR	TITLE	BEGINNING DATE	ENDING DATE	AMOUNT
7248 425 12	Water Management Districts	Allen, M. / Murie, D.	Investigation of Effects of Variable Flows on Water Chemistry Gradients & Fish Communities in the Lower Hillsborough River	12/23/2002	12/31/2004	\$61,137.50
7248 411 12	Water Management Districts St. John's River	Phlips, E.	Factors Controlling the Abundance and Composition of the blue-green Algae in Lake Griffin	08/14/2002	12/14/2004	\$110,000.00
7248 398 12	U.S. Dept. of Agriculture	Watson, C.	Review of Data Necessary for SLN Labeling of Trichlorofon for Ornamental Aquaculture	06/01/2002	05/31/2004	\$19,073.00
7248 399 12	U.S. Dept. of Agriculture	Watson, C. A.	Development of Design Criteria for Recirculating Ornamental Fish	06/01/2002	05/31/2004	\$89,329.00
7248 400 12	U. S. Dept. of Agriculture	Yanong, R. P.	Use of 17-Alpha Methyltestosterone (MT) for Expression of Male Secondary Sexual Characteristics in Ornamental Fish	06/01/2002	05/31/2004	\$73,058.00
7248 402 12	U.S. Dept. of Agriculture	Baker, P. / Baker, S.	Genetic Analysis of Hard Clam (Mercenaria Mercenaria) Performance in Commercial Culture	06/01/2002	05/31/2004	\$142,897.00
7248 403 12	U.S. Dept. of Agriculture	Baker, S. / Sturmer L.	CLAMMRS (Clam Lease Assessment, Management, and Modeling Using Remote Sensing): Alligator Harbor Aquaculture Use Area	06/01/2002	05/31/2004	\$50,683.00
7248 404 12	U.S. Dept. of Agriculture	Baker, S. / Degner, R.	Diversification for Hard Clam Aquaculture Industry Through Investigation of Blood Ark, Anadara Ovalis & Ponderous Ark...	06/01/2002	05/31/2004	\$81,052.00
7248 405 12	U.S. Dept. of Agriculture	Francis-Floyd, R. / Yanong, R.	Preliminary Health Assessment of Cultured Hard Clams in Florida	06/01/2002	05/31/2004	\$16,677.00
7248 406 12	U.S. Dept. of Agriculture	Phlips, E. / Baker, S.	Implementation of Eadin: Expert Assistance and Distance Identification Network	06/01/2002	05/31/2004	\$70,000.00
7248 407 12	U.S. Dept. of Agriculture	Phlips, E. / Baker, P.	Integration of Clams into Wastewater Treatment: A Diary Model	06/01/2002	05/31/2004	\$50,937.00
7248 420 12	Am Assn For Advance of Science	Dunsmore, R / Frazer, T	Application of Landscape Ecology Principles to the Design & Management of Marine Protected Areas in Coral Reef Ecosystem	11/12/2002	05/11/2004	\$39,000.00
7248 392 12	U.S. Dept. of Commerce	Lindberg, W. / Murie, D.	Bioenergetics Response of Gag Grouper to Reef Habitat	02/01/2002	01/31/2004	\$82,440.00
7248 413 12	St. Johns River	Phlips, E.	Biological Monitoring of the Lower St. Johns River: Temporal and Spatial Trends in Plankton	09/26/2002	01/26/2004	\$56,717.00
7248 418 12	St. Johns River	Phlips, E.	Phytoplankton Abundance and Composition in the Indian River	07/09/2002	07/30/2003	\$10,000.00
7248 396 12	Florida DEP	Canfield, D.	Florida LAKEWATCH 7/1/02 through 6/30/03	07/01/2002	06/30/2003	\$450,000.00
7248 409 12	DACS Alachua Regional	Watson, C.	Tropical Aquaculture Laboratory Support	07/01/2002	06/30/2003	\$121,260.00
7348 423 13	Marine	Canfield, D.	Fishing for Success	09/01/2002	06/30/2003	\$45,000.00
7248 417 12	Fl. Fish & Wildlife Consv. Comm.	Allen, M.	Hatching Duration, Growth & Survival of Age -0 Largemouth Bass along a Latitudinal Gradients of Florida	09/20/2002	06/30/2003	\$43,504.00
7248 412 12	Fl. Fish & Wildlife Consv. Comm.	Allen, M.	Analysis of Statewide Stream Monitoring Fisheries Database	09/26/2002	06/30/2003	\$35,000.00
7248 428 12	Dept. of Agricul & Consumer Serv.	Chapman, F. A.	Technology for the Aquaculture of Sturgeon in Florida	12/10/2002	06/30/2003	\$80,000.00
7248 414 12	Fl. Fish & Wildlife Consv. Comm.	Allen, M.	Fish Community Study in the Alafia River	09/10/2002	06/15/2003	\$19,050.00
7348 401 13	U.S. Dept. of Commerce	Jacoby, C.	Invasive Species in Florida's Saltwater Systems	06/04/2002	05/30/2003	\$10,800.00
7248 429 12	FL Fish & Wildlife Conserv. Comm.	Murie, D.	Conservation Research on Gulf of Mexico Sturgeon	03/04/2003	05/04/2003	\$30,870.00
7248 394 12	Dept. of Environmental Protect.	Phlips, E.	GTMNERR Water Quality Monitoring	05/07/2002	04/30/2003	\$35,110.00
7348 415 13	Hillsborough County	Canfield, D.	Florida LAKEWATCH Program: Hillsborough County	07/01/2002	03/31/2003	\$96,600.00

Water

Lakewatch

Mark Hoyer's info about LAKEWATCH activities in the area is below, including a citation for an extension publication that grew out of Project COAST.

Hauxwell, J., C. Jacoby, T.K. Frazer and J. Stevely. Nutrients and Florida's Coastal Waters: the Links Between People, Increased Nutrients and Changes to Coastal Aquatic Systems. Florida Sea Grant Publication SGEB-55. Florida Sea Grant, Gainesville, Florida. 10 pp.

Samples in Suwannee River drainage

Number of total lakes: 57

Number of active (sampled last year) lakes: 24

Number of Coast: 0

Number of total rivers: 18

Number of active (sampled last year) rivers: 3

Number of total springs: 5

Number of active (sampled last year) springs: 1

Number of total special samples: 17

Number of active (sampled last year) special samples: 9

2003 LAKEWATCH Reports

Florida LAKEWATCH. 2003. Florida LAKEWATCH Annual Data Summaries 2002. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.

Florida LAKEWATCH. 2003. Long-term fish population trends in Florida lakes: 2002. data. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.

Florida LAKEWATCH Information Circulars

- Florida LAKEWATCH. 1999. A beginners guide to water management-The ABCs, Descriptions of commonly used terms. Information Circular #101. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.
- Florida LAKEWATCH. 2000. A beginners guide to water management-Nutrients. Information Circular #102. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.
- Florida LAKEWATCH. 2000. A beginners guide to water management-Water clarity. Information Circular #103. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.
- Florida LAKEWATCH. 2001. A beginners guide to water management-Lake Morphology. Information Circular #104. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.
- Florida LAKEWATCH. 2001. A beginners guide to water management-Symbols, Abbreviations & Conversion Factors. Information Circular #105. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.
- Florida LAKEWATCH. 2003. A beginners guide to water management-Bacteria. Information Circular #106. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.
- Florida LAKEWATCH. 2003. A beginners guide to water management-Fish Kills. Information Circular #107. Department of Fisheries and Aquatic Sciences, University of Florida/Institute of Food and Agricultural Sciences. Library, University of Florida. Gainesville, Florida.

OTHER RELATED PROGRAMS

Department Wildlife Ecology and Conservation

Mercury in birds of Seahorse Key, project of **Peter Frederick** of Department of Wildlife Ecology and Conservation., funded under CRIS project WRS-03381.

Family and Consumer Sciences

Building Social Capital Through Nonprofit Leadership. A workshop to teach concepts of social capital and local leadership. **Elizabeth Bolton**.

Board Development and Governance. A workshop on board development and rules. **E. Bolton**.

Getting to Know Yourself as a Leader. A workshop using the MBTI as a context. **E. Bolton**.

Community Partnerships. A workshop using the business plan as a context for community organizations to identify and solve local issues. **E. Bolton**.

Developing the Local Leadership Program. Workshop. **E. Bolton**.

PUBLICATIONS

FDACS vegetable and row crop BMP manual. **G. Hochmuth and E. Simonne** are the lead IFAS authors working with FDACS staff (**R. Budell and B. Bartnick**) to produce a 200-page vegetable and row crop BMP manual.

Newsletter, The Poop Scoop, from the LWTL program, containing updates about timely topics pertaining to nutrient management. The audience for the newsletter includes the IFAS county faculty and staff of governmental agencies dealing with nutrient management issues.

EDIS publications. Many EDIS documents have been produced over the last two years dealing with nutrient BMPs, impacting the Suwannee Valley area. Please see

accompanying document which lists EDIS documents pertaining to the Suwannee Region.

PROPOSALS:

T-STAR program

Organic greenhouse herb production. Proposal for organic herb production including work on nutrient management (\$150,000 for 3 years, **B. Hochmuth, G. Hochmuth, E. Simonne**, and others).

FDACS Nitrate BMP program (new program)

Mineralization of N in livestock wastes in the Suwannee Valley area. (**G. Hochmuth, D. Graetz, and J. Jones**).

EPA 319

Nutrient BMPs for row crops, poultry, and dairy (years 4 and 5). (**D. Graetz, W. Graham, and G. Hochmuth**).

Many others not listed.

Suwannee River Partnership

The Suwannee River Partnership was formed in 1999 as a coalition of state, federal and regional agencies, local governments, and private industry representatives working together to reduce nitrate levels in the surface waters and groundwater within the Middle Suwannee and Santa Fe river basins, or watersheds. The Partnership initially focused on the Suwannee River Basin. The program's success led to expansion into the Santa Fe River Basin in 2003.

The Partnership's mission is to determine the sources of nutrient loads to the Suwannee and Santa Fe river basins, and to work with local land users to minimize future nutrient loading through voluntary, incentive-based programs. The group is focusing on finding the most economical and technologically feasible BMPs available to help farmers and other land users satisfy regulatory requirements for protecting public health and the environment. Through education and outreach programs, the group continues to increase public awareness of the issues, and encourage citizen and community participation in working together to find solutions.

Additionally, the partnership maintains the BMP Quality Assurance Program, County Alliance for Responsible Environmental Stewardship (CARES), and the On-farm Research Program.